REMARKS/ARGUMENTS

Claims 5-28 are pending in this application.

Claims 5, 6, 8-15, 17-19, 21-26, and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takagi et al. (U.S. 5,726,611) in view of Harpham (U.S. 5,825,259). Claims 16 and 27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takagi et al. in view of Harpham, and further in view of Yamaguchi et al. (U.S. 5,831,505). Claims 7 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takagi et al. in view of Harpham, and further in view of Timashov et al. (U.S. 6,900,717). Applicants respectfully traverse the rejections of Claims 5-28.

Claim 5 recites:

> A circuit including a choke coil, comprising:
> **first and second signal lines via which differential transmission communication is performed and on which a power supply current is sent out**;
> **third and fourth signal lines via which differential transmission communication is performed and on which the power supply current returns**; and
> **a choke coil having first, second, third, and fourth windings, and a magnetic core constituting a closed magnetic path in which the first, second, third, and fourth windings are wound**; wherein
> the first, second, third, and fourth windings are electrically connected to the first, second, third, and fourth signal lines, respectively;
> **the first winding and the second winding are wound in the same direction so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows, and the third winding and the fourth winding are wound in the same direction so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows**; and
> the first and second windings and the third and fourth windings are wound so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows. (emphasis added)

With the unique combination and arrangement of features recited in Applicants' Claim 5, including the features of "first and second signal lines via which differential

transmission communication is performed and on which a power supply current is sent out," "third and fourth signal lines via which differential transmission communication is performed and on which the power supply current returns," "a choke coil having first, second, third, and fourth windings, and a magnetic core constituting a closed magnetic path in which the first, second, third, and fourth windings are wound ," and "the first winding and the second winding are wound in the same direction so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows, and the third winding and the fourth winding are wound in the same direction so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows," Applicants have been able to provide a compact choke coil having large inductance and better high-frequency characteristics that can be inserted in a signal line circuit complying with IEEE 802.3af (see, for example, the first full paragraph on page 5 of the Substitute Specification).

In Section No. 1 on pages 2 and 3 of the outstanding Office Action, the Examiner alleged that Takagi et al. teaches all of the features recited in Applicants' Claim 5, except for the signal lines via which differential transmission communication is performed. The Examiner further alleged that Harpham teaches this feature. Thus, the Examiner concluded, "[I]t would have been obvious ... to use differential transmission signal lines as taught by Harpham to connect to windings as disclosed by Takagi [et al]. The motivation would have been to have differential inputs to the wires." Applicants respectfully disagree.

The Examiner relied upon Fig. 25a of Takagi et al. to allegedly teach the first, second, third and fourth windings recited in Applicants' Claim 5. However, as clearly disclosed in lines 25-37 of col. 15 of Takagi et al., Fig. 25a teaches **only a single pair of windings** which are wound around the first core arm 250_{a1} in one direction and around the second core arm 250_{a2} in the opposite direction. Thus, at best, Takagi et al. teaches **only a single pair of windings** (i.e., first and second windings), and certainly fails to teach or suggest the feature of "a choke coil having **first, second, third, and**

fourth windings, and a magnetic core constituting a closed magnetic path in which the first, second, third, and fourth windings are wound" (emphasis added) as recited in Applicants' Claim 5.

In addition, in contrast to the Examiner's allegation, there is no proper motivation to combine the teachings of Harpham with Takagi et al.

First, Figs. 4-5C and lines 9-20 of col. 9 of Harpham teach two separate and distinct common mode choke coils having two cores 12 and 16 which are formed as an integral binocular type core, whereby the two limbs of the binocular core are magnetically independent of each other even if physically joined. In contrast, in Takagi et al., the common mode choke coil produces a high impedance with respect to common-mode currents by magnetically coupling magnetic fluxes produced in the core by the common-mode currents to all wires wound around the core.

In other words, construction and operation of the common-mode choke coil of Harpham is completely different from the construction and operation of the common-mode choke coil of Takagi et al. Thus, one of ordinary skill in the art would not have been motivated to modify the common-mode choke coil of Takagi et al. in view of the teachings of Harpham.

Second, the Examiner has merely stated a conclusion (providing Takagi et al. with differential inputs) instead of providing a motivation for combining Takagi et al. and Harpham, and particularly, has failed to explain why it would have been desirable to one of ordinary skill in the art to have differential inputs to the wires of the common-mode choke coil of Takagi et al., or what advantages would have been obtained by providing differential inputs to the wires of the common-mode choke coil of Takagi et al. Neither Takagi et al. nor Harpham teaches nor suggests that the structure of common-mode choke coil of Takagi et al. is suitable for use with differential inputs, and the Examiner has failed to provide any evidence that the structure of the common-mode choke coil of Takagi et al. is suitable for use with differential inputs.

In fact, lines 18-27 of col. 10 of Takagi et al. specifically disclose:

> When normal-mode currents In flow through the pair of wound wires W_i and W_j, magnetic fluxes Φ_{ni} and Φ_{nj} flow in the first core arm 50a as shown in FIG. 10b. Since the wound wires of each pair are closely positioned, namely a parallel pair wires contacted with each other and wound around the same magnetic path, the magnetic fluxes Φ_{ni} and Φ_{nj} flowing in the core 50 have the same amount and opposite flowing directions causing themselves to compensate each other. As a result, if the normal-mode current In flow, no leakage inductance Ld will be produced with little insertion loss.

Thus, Applicants respectfully submit that the structural arrangement of elements of Takagi et al. is specifically designed to compensate normal-mode currents, and would not have been suitable for use with differential inputs.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of Claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Takagi et al. in view of Harpham.

Claim 18 recites:

> A choke coil that is inserted in a signal line having communication and power-provision functions, comprising:
>
> first and second bobbins each having a substantially cylindrical body portion;
>
> **a first winding that is closely wound in a single layer on the substantially cylindrical body portion of the first bobbin and a second winding that is closely wound in a single layer over the first winding**;
>
> **a third winding that is closely wound in a single layer on the substantially cylindrical body portion of the second bobbin and a fourth winding that is closely wound in a single layer over the third winding**; and
>
> a magnetic core having leg portions that are inserted through holes in the substantially cylindrical body portions of the first and second bobbins to define a closed magnetic path; wherein
>
> the first winding and the second winding are wound in the same direction so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows;

> the third winding and the fourth winding are wound in the same direction so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows; and
>
> the first and second windings and the third and fourth windings are wound so that magnetic fluxes generated in the magnetic core are mutually strengthened when an in-phase noise current flows.

The Examiner alleged that the combination of Takagi et al. and Harpham teaches all of the features recited in Applicants' Claim 18. Applicants respectfully disagree.

The Examiner alleged that Figs. 8a-8c of Takagi et al. teaches the features of "a first winding that is closely wound in a single layer on the substantially cylindrical body portion of the first bobbin and a second winding that is closely wound in a single layer over the first winding" and "a third winding that is closely wound in a single layer on the substantially cylindrical body portion of the second bobbin and a fourth winding that is closely wound in a single layer over the third winding" as recited in Applicants' Claim 18. This is clearly incorrect.

Lines 9-42 of col. 9 of Takagi et al. disclose that Figs. 8a-8c show three different ways of winding **<u>a single pair of wires</u>** around a core 50a. In Fig. 8a, "the contacted wires pair is wound around the core 50a in a single layer so that the wound pair runs in a one-way direction along the core 50a (one-way winding) in a sequential order as W_1, W_2,..., W_n with a space h between the neighbor windings by inserting a part such as a spacer (not shown)." In Fig. 8b, "the contacted wires pair in wound around the core 50a in double layers so that the wound pair runs in a one-way direction along the core 50a (one-way winding). Namely, the contacted wires pair is at first wound by two turns around the core 50a in double layers as shown by W_1 and W_2, then wound by two turns W_3 and W_4 with putting a space h between the two turns windings by inserting a spacer (not shown). Similar, one way winding in double layers will be sequentially executed until the last wound pair W_{n-1} and W_n in this distributed winding section." In Fig. 8c, "the contacted wires pair is wound around the core 50a in double layers so that the wound pair runs forward and backward along the core 50a (return winding)."

Thus, at best, Figs. 8a-8c of Takagi et al. teaches **only a single pair of wires** (i.e., a first winding and a second winding) that are wound around the core 50a in three different ways. Neither Figs. 8a-8c nor any other embodiment of Takagi et al. teaches or suggest the features of "**a first winding** that is closely wound in a single layer on the substantially cylindrical body portion of the first bobbin and **a second winding** that is closely wound in a single layer over the first winding" and "**a third winding** that is closely wound in a single layer on the substantially cylindrical body portion of the second bobbin and **a fourth winding** that is closely wound in a single layer over the third winding" (emphasis added) as recited in Applicants' Claim 18.

The Examiner has failed to rely upon Harpham to allegedly teach any of the features recited in Applicants' Claim 18, and Harpham certainly fails to teach or suggest the features of "a first winding that is closely wound in a single layer on the substantially cylindrical body portion of the first bobbin and a second winding that is closely wound in a single layer over the first winding" and "a third winding that is closely wound in a single layer on the substantially cylindrical body portion of the second bobbin and a fourth winding that is closely wound in a single layer over the third winding" as recited in Applicants' Claim 18.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of Claim 18 under 35 U.S.C. § 103(a) as being unpatentable over Takagi et al. in view of Harpham.

In view of the foregoing amendments and remarks, Applicants respectfully submit that Claims 5 and 18 are allowable. Claims 6-17 and 19-28 depend upon Claims 5 and 18, and are therefore allowable for at least the reasons that Claims 5 and 18 are allowable.

In view of the foregoing amendments and remarks, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

To the extent necessary, Applicants petition the Commissioner for a One-Month Extension of Time, extending to July 10, 2006, the period for response to the Office Action dated March 10, 2006.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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/Christopher A. Bennett #46,710/
Attorneys for Applicant(s)

KEATING & BENNETT, LLP
8180 Greensboro Drive, Suite 850
Tyson's Corner, VA 22102
Telephone: (703) 637-1480
Facsimile: (703) 637-1499

Joseph R. Keating
Registration No. 37,368

Christopher A. Bennett
Registration No. 46,710